Sonogram of Safety: Ultrasound outperforms the 5th intercostal space for tube thoracostomy site selection

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Project Summary

Identification of tube thoracostomy insertion location is currently performed using a blind, landmark based approach based on either the fifth intercostal space or inframammary crease in the midaxillary line. Previous research has shown that physicians have difficulty applying the landmark based approach to accurately identify safe locations for tube thoracostomy insertion. Approximately 30% of tube thoracostomies result in some sort of complication. A number of studies have shown that point of care ultrasound is an effective means for identifying safe insertion sites for thoracentesis, a procedure similar to tube thoracostomy. This pilot study aimed to assess whether bedside ultrasound could aid in identifying safe tube thoracostomy insertion sites in emergency department patients."

Action Items/Outcome

Bedside ultrasound was used on 50 patients in the ED to evaluate the location of the diaphragm relative to the 5th intercostal space. Using rib palpation, the fifth intercostal was identified and the ultrasound probe was placed over this location. It was recorded whether the diaphragm was above, below or crossing this point during a normal respiratory cycle. Ultrasound showed that approximately 6% of sites identified using landmarks would result in a subdiaphragmatic insertion of a tube thoracostomy. Additionally, approximately 13% of the landmark sites could potentially lead to diaphragmatic injury as the diaphragm crossed the insertion site during the respiratory cycle.

Conclusion/Reflection

Bedside ultrasound is a low cost, safe, and readily available modality that has been shown to improve the safety and success rates of central lines, paracentesis, thoracentesis, and a number of other common medical and surgical procedures. While this pilot study is small, bedside ultrasound was able to identify that close to a fifth of landmark based tube thoracostomy insertion sites might cause harm to patients. The routine use of ultrasound in the ED for this procedure can minimize these complications.